

What is claimed is:

1. A polynucleotide comprising a first nucleic acid encoding a light-generating gene product and a second nucleic acid encoding a selectable marker, wherein said selectable marker
5 allows for selection of said polynucleotide in a eukaryotic host.

2. The polynucleotide of claim 1, wherein said light-generating gene product is a bioluminescent gene product.

10 3. The polynucleotide of claim 2, wherein said bioluminescent gene product is luciferase.

4. The polynucleotide of claim 1, wherein said selectable marker is neomycin phosphotransferase.

15 5. The polynucleotide of claim 1, further comprising a regulatory element operably linked to said first nucleic acid and second nucleic acid.

20 6. The polynucleotide of claim 5, wherein said regulatory element effects constitutive expression of said bioluminescent gene product in a cell.

7. The polynucleotide of claim 5, wherein said regulatory element effects inducible expression of said bioluminescent gene product in a cell.

25 8. A vector comprising the polynucleotide of claim 1.

9. The vector of claim 8, wherein said vector is viral vector.

30 10. The vector of claim 8, wherein said viral vector is a retroviral vector.

11. A cell comprising the polynucleotide of claim 1 or the vector of claim 8.

12. The cell of claim 11, wherein said cell is a prokaryotic cell.

5 13. The cell of claim 11, wherein said cell is a eukaryotic cell.

14. The cell of claim 13, wherein said cell is a primary cell.

15. The cell of claim 13, wherein said cell is a tumor cell.

10

16. The cell of claim 14, wherein said cell is stably transformed with said polynucleotide or vector.

15

17. The cell of claim 14, wherein said vector is integrated into an endogenous chromosome of said cell.

18. A non-human mammal comprising the polynucleotide of claim 1.

19. The mammal of claim 18, wherein said non-human mammal is a rodent.

20

20. A method for imaging a cell, the method comprising providing a cell containing a polynucleotide comprising a first nucleic acid encoding a light-generating gene product and a second nucleic acid encoding a selectable marker, wherein said selectable marker allows for selection of said nucleic acid in a eukaryotic host; and contacting said cell with a substrate for said light-generating gene product; and detecting light, thereby imaging said cell.

25

21. The method of claim 20, wherein said cell is provided in vitro.

30

22. The method of claim 20, wherein said cell is provided in vivo.

23. The method of claim 20, wherein said cell is a tumor cell.

24. The method of claim 20, wherein said tumor is a hematologic tumor.

25. The method of claim 20, wherein said tumor is a metastatic tumor.

26. The method of claim 23, wherein said metastatic tumor is a metastatic breast, liver and brain.

27. A method for identifying a tumor inhibitor, the method comprising providing a mammal comprising a cell carrying a transgenic polynucleotide including a first nucleic acid encoding a light-generating gene product and a second nucleic acid encoding a selectable marker, wherein said selectable marker allows for selection of said polynucleotide in a

eukaryotic host;

administering a test agent to said mammal;

contacting said cell with a substrate for said light-generating gene product;

detecting light emitted from said cell, and

comparing the level of emitted light to the level of light emitted in the absence of the test agent, wherein a lower level of emitted light indicates the test compound is a tumor inhibitor.

28. The method of claim 27, wherein said mammal is a rodent.

29. A method for identifying a modulator of a signal transduction pathway, the method comprising

providing a mammal comprising a cell carrying a transgenic polynucleotide including a first nucleic acid encoding a light-generating gene product and a second nucleic acid encoding a selectable marker, wherein said selectable marker allows for selection of said polynucleotide in a eukaryotic host, and a regulatory element whose activity is dependent on a component of said signal transduction pathway;

administering a test agent to said mammal;
contacting said cell with a substrate for said light-generating gene product;
detecting light emitted from said cell, and
comparing the level of emitted light to the level of light emitted in the absence of the test

5 agent, wherein a lower level of emitted light indicates the test compound is a modulator of said
signal transduction pathway.

30. A transgenic non-human animal comprising a recombinant nucleic acid molecule
stably integrated into the genome of said animal, said molecule comprising a cis-acting
10 regulatory sequence and a nucleic acid encoding a light-generating gene product.

31. The animal of claim 30, wherein said cis-acting regulatory sequence is selected from
the group consisting of Ang-2, Flk1, FLT3, AP-2, Her-2/Neu and c-myc.

15 32. The animal of claim 30, wherein said light-generating gene product is selected from
the group consisting of ferredoxin IV, green fluorescent protein, red fluorescent protein, yellow
fluorescent protein, blue fluorescent protein, the luciferase family and the aequorin family.

20 33. The animal of claim 32, wherein said recombinant nucleic acid molecule is of human
or murine origin.

34. An isolated cell of the animal of claim 30.

25 35. The cell of claim 34, wherein said cell is a stem cell, a germ cell, a precursor cell or a
progenitor cell.

36. A transgenic non-human animal comprising a recombinant nucleic acid molecule
stably integrated into the genome of said animal, said recombinant nucleic acid molecule
comprising SEQ ID NO:1 and a nucleic acid encoding a light-generating gene product.

30

37. The animal of claim 36, wherein said animal is a mouse.

38. A method for the production of a transgenic non-human animal, comprising introduction of a recombinant nucleic acid molecule comprising a cis-acting regulatory sequence and a nucleic acid encoding a light-generating gene product into a germ cell, an embryonic cell, an egg cell or a cell derived therefrom.

39. The method of claim 38, wherein said animal is a rodent.

40. The method of claim 39, wherein said rodent is a mouse.

41. A method for the identification of a compound capable of modulating angiogenesis, comprising:

(a) contacting the transgenic non-human animal of claim 36 or a cell thereof with a test compound; and

(b) measuring the effect of said test compound on the expression of said nucleic acid encoding a light-generating gene product; thereby identifying a compound that modulates angiogenesis.

42. The method of claim 41, wherein said compound increases angiogenesis.

43. The method of claim 41, wherein said compound decreases angiogenesis.

44. A method of validating the presence of or an activity of a biological component in a signal transduction pathway, comprising

providing a non-human mammal comprising a cell carrying a transgenic polynucleotide including a first nucleic acid encoding a light generating gene product and a second nucleic acid encoding a regulatory element whose activity is dependent upon a component of said signal transduction pathway;

administering an inhibitor of said biological component to said mammal;

contacting said cell with a substrate for said light-generating gene product:

detecting light emitted from said cell; and

comparing the level of emitted light to the level of light emitted in the absence of the inhibitor, wherein a lower level of emitted light indicates that said biological component is in said signal transduction pathway.

45. The method of claim 44, wherein said biological component is a polypeptide or a nucleic acid.

46. The method of claim 44, wherein said signal transduction pathway is a tumor-associated signal transduction pathway.

47. The method of claim 44, wherein said inhibitor is selected from the group consisting of iRNA, antisense RNA, and an antibody that immunospecifically binds to said biological component.

48. The method of claim 44, wherein said transgenic polynucleotide further comprises a selectable marker.

49. An embryonic stem cell derived from the the albino mouse strain C57BL/6- Tyr^{cl/c}.